

**STRATEGY
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**ADAPTIVE TRANSFORMATION MODEL – A BRANCH TO THE
ARMY TRANSFORMATION CAMPAIGN PLAN**

BY

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ABSTRACT

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The current Army Transformation Plan follows three paths...modernization of the Legacy force, development of an interim capability (the IBCTs), and transformation to an Objective Force by 2032. The development of the Objective Force is dependent on several technological breakthroughs. There are at least two major challenges to this approach. First, it is unlikely that the required technological breakthroughs will be made before the technology decision is made in 2003 for continuation of R&D for the Objective Force. Second, and even more critical, it does not allow the future Army to adapt rapidly to the changes in the form of warfare and to the potential "leap-ahead" capabilities posed by our adversaries. The Army should continually modernize its forces, in an iterative way that achieves radical transformation. This paper suggests that the Army should be divided into five sequential modules, each of which will undergo a radical transformation every twenty to twenty-five years. This strategy will develop an institution that can adapt rapidly in response to the changing strategic environment, as well as reduce the predictability of the Army to potential adversaries. It will also allow the Army to take advantage of technological breakthroughs and emerging concepts in a timely manner.

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ADAPTIVE TRANSFORMATION MODEL—A BRANCH TO THE ARMY TRANSFORMATION CAMPAIGN PLAN

“Change is the law of life. And those that only look to the past or the present are certain to miss the future.”

—President John F. Kennedy, 25 January, 1963

The U.S. Armed Forces have served our nation exceptionally well for over 225 years, in war and in peace. The citizens of the United States can rest in peace every night under the blanket of security provided by their soldiers, sailors, airmen, and Marines. In nearly every conflict in which they have participated, U.S. armed forces have successfully defended the national interests, while demonstrating an ability to adapt to the realities they faced. At present it seems unlikely that the U.S. will confront a viable challenger to the position of world hegemon. However, the world is a changing place. The world of 2020 and beyond will present the United States and its armed forces with a different set of challenges than those of today. The United States must prepare today for the future. As the common wisdom posits, the future is full of uncertainty. Thomas Hobbes said, “no man can have in his mind a conception of the future, for it is not yet.”¹

Though one can not know the future, there are some reasonable assumptions that one can make to allow preparation for it. There are three aspects of the global environment of 2020 that are particularly relevant to the military strategists who will design and prepare U.S. armed forces for the future challenges. First, it is certain that the United States will continue to have global interests and will therefore find itself engaged with its world partners in a more complex environment resulting from increased globalization. The second relevant aspect of the future environment is that globalization will result in greater distribution of, and access to, technology and commercial products, to include militarily relevant technology and products. This means that the United States will find it increasingly difficult to maintain a lasting technological edge over its potential adversaries. Third, due to the increased openness facilitated by globalization, as well as an increasing interest in the continuation (or discontinuation) of the U.S. hegemony, Americans can expect their potential adversaries to observe U.S. armed forces and adapt their capabilities and operational concepts as the U.S. military transforms. These adaptations will be rapid and varied, most likely resulting in a proliferation of asymmetric approaches to conflict and warfare against the United States.

ARMY TRANSFORMATION

Given the changes to the global environment, the U.S. military must adapt to meet the requirements of the changing strategic environment. The Army, spurred by a poor showing during the Kosovo crisis in 1999, has developed a plan to transform itself into a more relevant force. Recognizing the need to deploy sufficient force more rapidly as the key to early prevention or resolution of conflicts, the Army Transformation Campaign Plan addresses current vulnerabilities and limitations, particularly in the area of force projection. In October of 1999, the Army Chief of Staff charged the Army establishment with developing a future force that would be more responsive, deployable, agile, versatile, lethal, survivable, and sustainable than the current force. Though the traditional Army approach has been one of incremental change, or minor improvements in capabilities, the Army Chief of Staff called for a radical transformation. The challenge for the Army, however, is that no one will relieve it of the responsibility to defend the nation's interests while it is transforming itself. Thus, the Army seeks a radical transformation, but at the same time it must maintain the ability to respond to the growing requirements of the dynamic global environment. To meet these complex requirements, the Army transformation strategy attempts to balance the near-, mid-, and long-term needs through a three-pronged campaign plan.

The first axis of the Army Transformation Campaign Plan maintains and upgrades current forces (the Legacy Force) to retain the Army's readiness to support CINC requirements. Second, the Army will rapidly develop several Interim Brigades, which will address the critical vulnerability of rapid deployment. These brigades will take advantage of lighter platforms and more integrated organizations to provide forces that can rapidly deploy, and are more easily sustained than current heavy forces. But the brigades will also remain sufficiently lethal

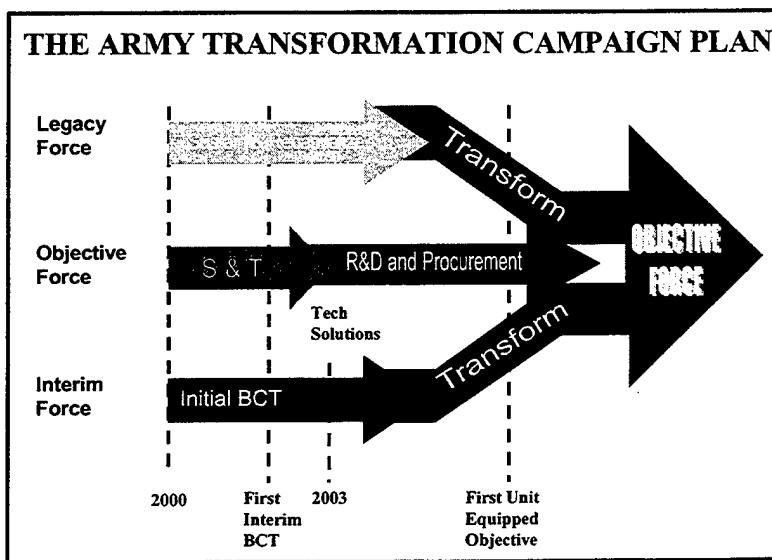


FIGURE 1: ARMY TRANSFORMATION CAMPAIGN PLAN

to accomplish most of the tasks required of Army forces. The third axis of the Transformation Campaign Plan is development of the Objective Force--that force that will be in existence at least through the first half of this century. It will be a force radically different from the Legacy Force in all aspects of DTOLMS (doctrine, training, organization, leadership, materiel, and soldiers). Current plans are for the Objective Force to begin fielding in 2008, with completion by 2032. This timeline requires a decision in 2003 as to what technologies the Army will pursue through research and development, in order to meet fielding dates.

THE CHALLENGE

There are several challenges to the Army's transformation strategy. First, there is some internal opposition, particularly from the armor community, which holds that the currently envisioned Objective Force will lack sufficient "punch" to be decisive. Further, the Army lacks over \$130 billion that it needs for the transformation, though cancellation of a number of programs can reduce this total somewhat. Finally, the development of critical materiel for the Objective Force relies on several technological breakthroughs that many scientists doubt will occur in the near future.

In developing its transformation strategy, the Army must ensure that it does not become too focused on technology itself. It will simultaneously develop the doctrine and training strategies, build organizational frameworks, and educate future leaders to deal with the complexities they will face. This parallel and interrelated development process is termed spiral development, and should provide a more rapid force development cycle than traditional sequential force development models.

The Army may eventually convince its internal opponents that General Eric Shinseki is on the right track, and it may also work through the budgetary constraints. However, a fundamental challenge to the transformation strategy has to do with the ability of scientists to achieve the breakthroughs in technology that will lead to the development of the systems required by the Objective Force. The reality is that while technology and science are in the midst of radical breakthroughs in the electronics field, they are not as far along with the scientific breakthroughs that could allow the Army to radically change its weapons platforms.

Common wisdom is that the U.S. military may be in the midst of a Revolution in Military Affairs (RMA). However, that RMA actually comprises two sub-RMAs, one of which is already here, and the second of which the technology can not yet support. The first RMA rests on information technologies, which allow the U.S. military to link its sensors, decision making

processes, and weapons into a system of systems to make major strides in information dominance, and open the door to decision superiority.

The second Revolution

in Military Affairs has two axes. First, technological advances in nanotechnology, composite materials, fuel and propulsion systems, laser and other non-explosive weapons systems, along with continued advances in electronics, may allow development of lighter but more protected and lethal weapons systems and platforms, and provide other capabilities envisioned for the

Objective Force. The other axis of this second RMA includes the counter-capabilities and concepts that will emerge against the systems developed through the first RMA technology. Obviously, military planners will have to deal with these challenges as they develop future forces and operational concepts, preferably by anticipating possible enemy adaptations. The real revolution in military affairs will result from a synthesis of the two RMAs discussed here.²

The challenge for the Army is that there is virtually no possibility that the technologies of the second Revolution in Military Affairs will be available before the 2003 Objective Force technology decision point. Indeed, there is little likelihood that the key desired capabilities will be available before 2010. The choice then is either to delay the decision (and the resulting fielding of the forces) until the desired technologies becomes available, or to continue development (and fielding) of less than desired capabilities. Obviously, neither of these alternatives is desirable, nor acceptable within the framework of the Army Chief of Staff's vision for transformation. The developers of Joint Vision 2020 realized this eventuality as they argued that the movement toward the 2020 force would have to be evolutionary.

Based on the joint vision implementation program, many capabilities will be operational well before 2020, while others will continue to be explored and developed through exercises and experimentation.³

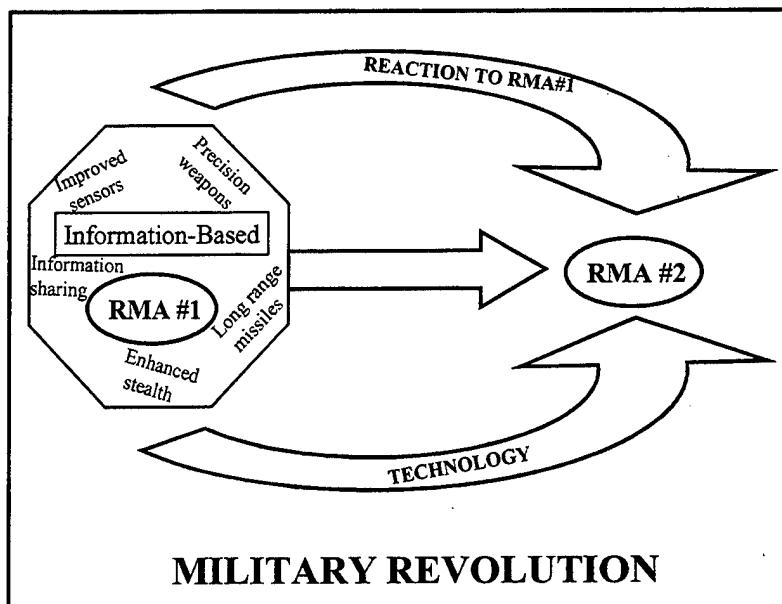


FIGURE 2: DUAL- STAGE MILITARY REVOLUTION

A PROPOSED SOLUTION

Though the Army Transformation Strategy is clearly moving in the right direction—the transformation to a force that is relevant to the changing strategic environment—the potential exists that it can become untracked. This deviation may result from internal bureaucratic dysfunctions; it may come from budgetary challenges; but almost certainly will result from technological limitations in meeting the optimistic timelines. The Army transformation strategy should include measures to alleviate the full effect of such challenges. Army planners can develop these measures as branches to the current strategy, in order to provide the Army with alternatives to either postponing the Objective Force or selecting a less-than-desired force capability. This paper will discuss **a possible branch to the current Army Transformation Strategy that would allow the Army to transform itself radically in an iterative way, while maintaining continual relevance in the dynamic global environment.**

As stated above, it is likely that America's potential adversaries will adapt their strategies, military forces, and operational concepts more rapidly than has been the case historically. Thus, the future will become a struggle between adversaries in terms of the pace of adaptation. **The fundamental leg on which the U.S. Army's future strategy stands is that the organization must adapt rapidly, particularly relative to its potential adversaries.** As one commentator notes,

...the corollary to Newton's fundamental law of physics resounds with a sense of urgency—every technical or tactical innovation that provides a dominant military advantage eventually yields to a countervailing response that shifts the advantages to the opposing force.⁴

The Army must close the gap between development of new technologies, or new ideas on how to fight, and its absorption into doctrine. Return to Hobbes' Leviathan for a minute: "no man can have in his mind a conception of the future, for it is not yet." As the future is inherently uncertain, planners can not hope to be exactly right in forecasts. Nor is it likely that whatever force the Army develops for the future will be exactly the right one. But that is not really what is critical. What is important is that the Army is not so far wrong that it can not adapt to realities as the future becomes the present. As Michael Howard said,

I am tempted to declare dogmatically that whatever doctrine the armed forces are working on now, they have got it wrong. I am also tempted to declare that it does not matter that they got it wrong. What does matter is their capability to get it right quickly when the moment arrives...it is the task of military science in an age of peace to prevent the doctrine from being too badly wrong.⁵

How does the Army best develop itself so that it can rapidly adapt to “what is right”? There are two ways. First, the Army can not afford to be too wrong, so it must develop its force in such a way that it continually adapts to the present, or, better, to the foreseeable future, so that it is closer to being ready for the future. Second, the Army must develop as an institution so that it can rapidly adapt to the realities of the near-future when required. The great strength of the United States during the two world wars, as well as during the Cold War, was that it could mobilize its great economy and innovative minds to develop the means for decisive victory. However, it took years in each case. Forecasts of the future suggest that there will not be much time to adapt. So, the organization has to be faster. The greatest strategic requirement of the transformation, then, is to be able to adapt rapidly—more rapidly than potential adversaries.

In developing the Interim Brigades, the Army is now in the process of fielding two Initial Brigade Combat Teams, with two purposes. First, these brigades will provide responsive Army forces to the CINCs within the next few years. Secondly, and more critical to the issue at hand, they provide the experimental base for development of the Interim Brigades and the future Objective Force. In this light, the greatest value of the IBCTs is that they are forcing the Army to think and explore—potentially without institutional constraint. This exploration is not only in Doctrine, Training, Organization, Leadership Development, Materiel, and Soldier Development (DTOLMS), but also in transformation of the defense establishment’s institutional practices for development of new forces and ideas.

The goal of spiral development is to develop all aspects of DTOLMS simultaneously to speed up the overall processes of development and to field forces more rapidly than under the old sequential development strategy. In essence, the IBCT is a living example of spiral development, as it is simultaneously developing all aspects of DTOLMS. **The thesis of this paper is that the Army's transformation should follow a never-ending spiral process—one that allows it to continually adapt to the global environment and take advantage of emerging technologies and ideas.** Thus, the Objective Force should represent a journey, not an end state.

THE ADAPTIVE TRANSFORMATION MODEL

This proposal attempts to address the challenges facing the Army's current transformation strategy, while maintaining the CSA's vision. **It is an adaptive strategy that follows an essentially evolutionary track towards a revolutionary change in the Army's capabilities**

and way of fighting, while maintaining the capability to insert revolutionary potential at any point along the track.

As described in the Army's Transformation Campaign Plan, Army forces will fall into two categories. The first will be Units of Employment (UE), essentially division and above structures, which will serve as higher headquarters in joint operations. These headquarters will act as an Army component or as a Joint Task Force headquarters, with augmentation as necessary. The other type of Army elements will be Units of Action (UA), which are organizations at brigade level and below. They will actually perform the Army's operational tasks. UEs will have UAs assigned or attached as required.⁶

The Adaptive Transformation Model suggests further segregating Army organizations into five modules, for purposes of modernization management. This segregation may also serve as a framework for employment options. The organization of the modules would evolve as force structure decisions are made by the Army's

leadership, but each would include combat, combat support, combat service support, and headquarters elements.

Army National Guard and Army Reserve elements would form portions of each module. Figure 3 includes a notional organization of the Army into modules.

For example, module one

might include several Interim Brigade Combat Teams, a corps headquarters, several division headquarters, and combat support and combat service support augmentation elements that should be associated with the IBCTs, as well as a slice of Echelon Above Corps support elements (from the active component and both of the reserve components). The module should include sufficient elements to make it capable of independent employment as a Joint Task Force or Component Army Force element (ARFOR). Module two might include the elements of

NOTIONAL MODULE COMPOSITION

MODULE 1	MODULE 2	MODULE 3
•1 Corps	•V Corps	•XVIII Corps
•25 ID	•1 AD	•82 ABN DIV
•10 ID	•1 ID	•101 AASLT DIV
•3 x SIB(e)	•2 ID	•3 X SIB(e)
•9 x BCT	•9 X BCT	•9 X BCT
•4 x Avn Bde	•4 x Avn Bde	•4 x Avn Bde
•4 x FS Bde	•4 x FS Bde	•4 x FS Bde
•COSCOM	•COSCOM	•COSCOM
•EAC Slice	•EAC Slice	•EAC Slice
MODULE 4	MODULE 5	
•9 x SIB (e)	•III Corps	
•9 x BCT	•1 CD	
•4 x Avn Bde	•3 ID	
•4 x FS Bde	•4 ID	
•COSCOM	•9 X BCT	
•EAC Slice	•4 x Avn Bde	
	•4 x FS Bde	
	•COSCOM	
	•EAC Slice	

FIGURE 3: NOTIONAL MODULE COMPOSITION

one of the existing Army Corps, to include all of its associated CS, CSS, and headquarters units, and an EAB slice.

Module 5 corresponds roughly to III Corps and associated units that make up the most modernized part of the legacy force (and includes units from both active and reserve components). It will undergo the currently planned upgrade program. This module will serve as the Army's "insurance policy" of lethal, survivable heavy forces able to deliver the decisive punch in the old fashion way until modern transformed forces could assume that role. Module five will be the last to undergo transformation.

Note from these examples that the modules are not necessarily of the same size, or composed of the same structure. Army leaders should consider numerous factors in determining the composition of the modules. These examples should not be construed to suggest that current force structure concepts should be maintained. It is likely that there will be significant changes in both command and control arrangements and in support requirements as future force concepts develop. Indeed, the Army must partner technological changes with conceptual and organizational changes to fully modernize its force capability.

ADAPTIVE TRANSFORMATION MODEL

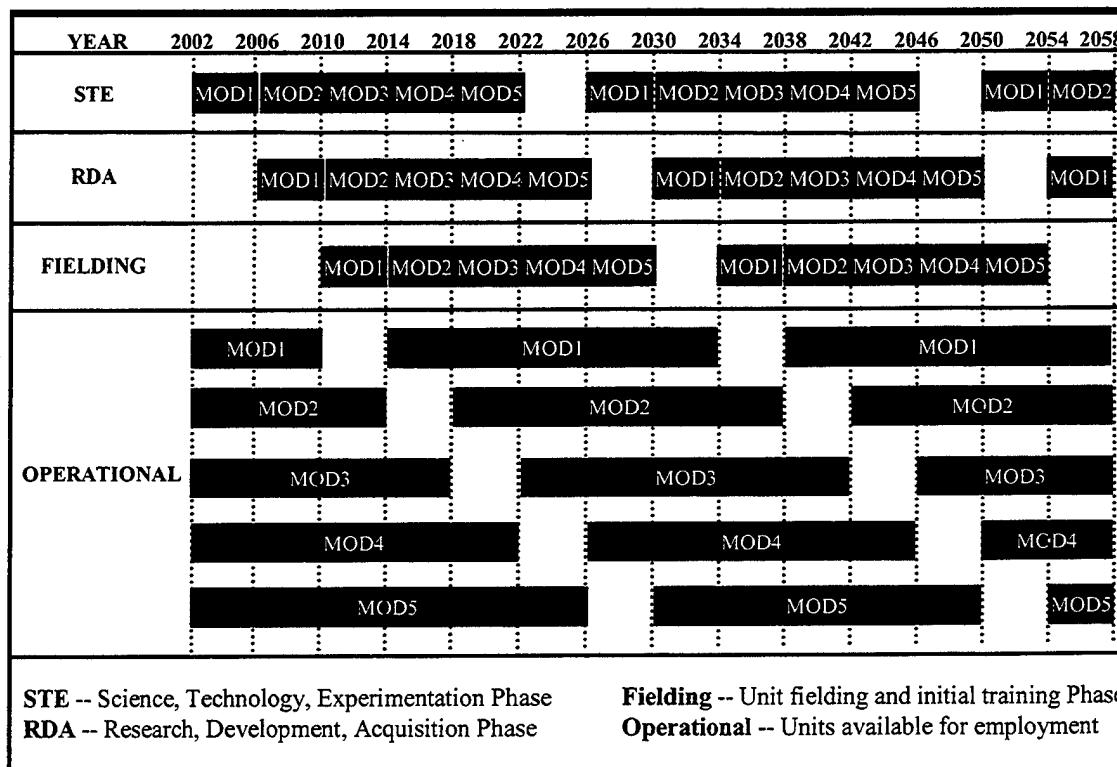


FIGURE 4: ADAPTIVE TRANSFORMATION MODULE

Each module represents a generation in continual modernization. At the end of its life cycle, all elements in the module would undergo another transformation to the next generation. The cycle for each modernization generation includes four phases: a Science, Technology, and Experimentation Phase (STE); a Research, Development, and Acquisition Phase (RDA); a Fielding Phase; and the Operational Phase. During the Science, Technology, and Experimentation Phase, the main effort should be in the science base to actualize potential technological breakthroughs that meet anticipated needs. Joint experimentation would identify force requirements during this phase. At the end of the three to five year STE phase, force developers would select technologies and concepts for use in designing the future forces in the module. Those technologies and concepts would mature through the RDA Phase. Though RDA is an acquisition term normally associated with materiel development only, this model uses the term RDA to include maturation of all aspects of DTOLMS. The end state for the RDA phase would be a package of materiel, doctrine, training strategies, organization, and personnel policies ready for fielding. The units of the module will then stand down from their current operational generation and reorganize, reequip, reman as necessary, and retrain to become a new generation. At the end of the Fielding Phase, the units of the module would return to the operationally available forces of the Army, and remain ready until time to field a new generation of the module.

This model suggests that each phase of the cycle should be four years. This results in a twenty-four year life cycle for each unit, including the overlapping STE and RDA phases. However, the period of each generation and of each phase of force development of a generation would be flexible, and depends on budgetary considerations,

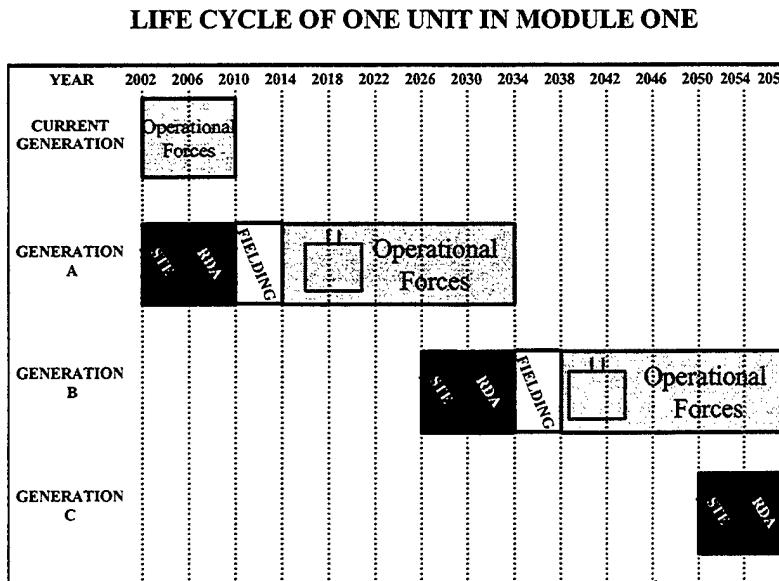


FIGURE 5: LIFE CYCLE OF ONE UNIT IN MODULE ONE

the acceleration rate of science and technological advancement, and changes in the political-

military environment. For purposes of illustration, assume the 13th Brigade Combat Team is in Module 2. Beginning the Science, Technology, and Experimentation phase in 2002, Research, Development, and Acquisition phase in 2006, and Fielding phase in 2010, the 13th BCT would be operational from 2014 through 2034, with STE for its next generation beginning in 2026. The unit would stand down during its next Fielding Phase (2034-2038), in order to field systems, reorganize units, and train soldiers before training the unit up to readiness for employment. Then it would return to the operational force in 2038. Similarly, the 14th BCT, a part of Module 3, would undergo STE and RDA from 2006 through 2014, field from 2014 to 2018, and be operational from 2018 through 2038, with its next generation fielding in 2038. 14th BCT would return to the operational forces in its new generation in 2042.

The concurrent development of doctrine, organization, and training strategies must coincide with the Science, Technology, and Experimentation phase and Research, Development, and Acquisition phase, along with personnel procurement and management strategies. Buying equipment is relatively simple compared to the greater challenge of transforming training, doctrine, management styles, and soldiers to meet battlefield conditions that will be more complex and demanding in the future, particularly in human terms. Therefore, the Army should follow a spiral development strategy similar to the process used in the ongoing development of the Initial Brigade Combat Teams. This development should capitalize on rapid prototyping of new systems so that training strategies and doctrine development can occur concurrently with the systems and soldiers.

To facilitate the rapid and concurrent development of Doctrine, Training, Organization, Leader Development, Materiel, and Soldier Development, Development and Fielding teams would form at the time of the technology and concept decisions at the end of the STE Phase. These teams would include officers, non-commissioned officers, Department of the Army civilians, and contractors organized (and trained) to develop the training programs, doctrine (to include initial Tactics, Techniques, and Procedures (TTP)), and organizational structures. Some institutional consistency will be required, suggesting a standing cadre of developers. This standing force development cadre would serve as the core of the development and fielding team. Other officers and NCOs would augment the team for development of the module that they will join. These officers and NCOs would then become the Fielding Team, providing an expert corps to stand up the new organizations. They would then become part of the new organizations.

For example, a mid-grade Captain may depart his unit in Module 3 to join the fielding team four years prior to the fielding of the next generation of Module 3. He would assist in developing

the doctrine for employment of his type unit throughout the RDA Phase, while attending mid-level education sometime during this period. During the Fielding Phase, he would assist in standing up the new unit and training the officers and NCOs on doctrine and TTP for the unit, then become an Operations Officer in one of the new units. Likewise, a Sergeant First Class might leave his position as a platoon sergeant to become an individual training developer. After developing the program for training newly accessed soldiers of specialty 99X and completing senior NCO education, he would become a First Sergeant of a training company six months prior to the beginning of the Fielding Phase to produce some trained soldiers for the new units. This continuity in function would assist in fielding the new units. Additionally, it would ensure that the development community constantly receives new inputs and energy.

DOCTRINE

The Army will have to develop doctrine faster than its adversaries in order to remain dominant in the coming decades. While the United States seeks dominance, its adversaries need only achieve denial capability. Thus, the U.S. military must be able to adapt quickly to denial strategies and capabilities. The current system for doctrine development is not conducive to rapid development. With the Adaptive Transformation Model, while some doctrine development could take place at the Department of the Army level, its more decentralized approach would speed the process, while also offering greater diversity in thought. A collaborative effort, similar to the method being used in the development of doctrine for the IBCTs, offers promise. The Development and Fielding Teams described above would serve a responsible headquarters element that is part of the module. That Unit of Employment headquarters (perhaps a selected corps or division headquarters) could serve as the lead for development of the doctrine for the next generation of its module, in conjunction with the development of corresponding joint and Army doctrine by Joint Forces Command and the Army Training and Doctrine Command.

Continued development of doctrine and Tactics, Techniques, and Procedures to maintain integrative capability with the rest of the joint world should also be decentralized. The corps or division headquarters responsible for development of the initial doctrine during the Research, Development, and Acquisition phase would retain the responsibility for TTP and doctrine development for the units of the module throughout its life cycle. This process would facilitate continued systemic development of organizational learning by the Army. Through testing of new concepts by the operational test centers, and the tactical battle laboratories, through distributed simulations and experiments by the joint world and between and within modules, and through a free-thinking cell of officers and NCOs recently from the field, the Army could develop

new concepts and doctrine in a more holistic manner. In addition, such a strategy would enhance the institution's learning by encouraging free-thinking in an unrestricted, protected, and insulated environment.

Training

Training of soldiers and units is perhaps the most critical aspect of achieving and maintaining military effectiveness. Given adequate technology, relatively minor improvements in individual and collective competence can yield disproportionately large increases in combat power. The adaptive transformation strategy capitalizes on this aspect through continued decentralized training. Module-specific training development should occur at the module level. This would prevent an overwhelming requirement for centralized individual training, and would ensure that a knowledgeable training cadre is available. However, the Army should retain a central training base for initial entry training and for low-density specialties common to all elements. The development and fielding teams would be responsible for development of specialized individual and unit training to include simulations, devices and facilities, and standards and POIs. The teams would capitalize on emerging training techniques such as imbedded and distributed simulations and the use of non-harmful projectiles.

The Army would restructure the existing individual training base so that each module has proponency and ownership of the training facilities required. The NCOs and officers required to staff the module's training base would come from the units of the module. Unit training would also be the responsibility of the module, though the Army and joint headquarters have a role in training the units of the module to operate as part of a Joint Task Force. The Combined Training Centers should continue to play the preeminent role in training units in a demanding environment. However, the CTCs should tailor their training packages to the emerging threats in the strategic environment and to the capabilities and structure of the friendly and possible enemy units.

Organization

Force structure will evolve rapidly along with the new equipment and ways of operating. Information technology will allow better information sharing at all levels. This sharing should obviate the need for as many levels of control elements as now exist. However, it is not likely that the ability of humans to command a greater number of elements simultaneously will increase. Indeed, given the greater complexity of the future environment and the demands on human commanders likely to result, it may be necessary to reduce the span of control in future

force structures. Thus, though the size of staffs may decline at levels of division and above, the leader to led ratio in company and below may actually increase. An additional consideration is that future requirements suggest that units be organized in a modular fashion. This model may be similar to the concept used by Special Operations Forces today, which organize small functional units into mission-capable packages tailored to the mission. To enable this modularity, it is likely that smaller self-contained units will require higher leader ratios. These are two aspects that suggest that force structure will be an evolving phenomenon in future forces.

Each generation of modernization of the Army's forces will require an independent analysis to determine the appropriate force structure. The organizational structure of the units in a module should undergo the same testing and experimentation that the doctrinal concepts and equipment would undergo during the Science, Technology, and Experimentation phase. Force structure decisions should be zero-based, with no requirement to make changes to the current structure. Again, development and fielding teams should receive much latitude in developing innovative force structure. Full-time force developers will be part of the team to assist in feasibility and cost analysis and to facilitate building the TOEs for the units in the module. Unit force structure decisions should be made early in the Research, Development, and Acquisition phase, so that TOEs can be built, and so that personnel and equipment acquisition strategies can mature prior to the fielding phase.

Leadership

The battlefield of the future will require a greater level of independent action at lower levels. Thus, junior leader initiative, independence of thought, and innovation will be at a premium. As they do today, small unit leaders will have to make decisions in the face of great uncertainty. While the technical and tactical aspects of warfighting develop through training, the qualities of innovation and independence required of future leaders develop through experience and education. As one senior leader noted, "we train for certainty, and educate for uncertainty."

Leader development should place great emphasis on education early in the career of officers and non-commissioned officers. Though there will continue to be a requirement for staff officers with highly technical educational backgrounds, the education discipline that develops initiative and innovation is more liberal and general. Army professional development programs should include more education opportunities for officers and NCOs, and at earlier stages than is currently the norm.

Materiel

The adaptive transformation strategy is highly dependent on a robust science and technology establishment. This effort will be in two parts. While a part of the establishment would focus on the development of near-term technological breakthroughs to support each module's Science, Technology, and Experimentation phase, the remainder of the Science and Technology community would focus farther out. At the beginning of a module's STE phase, those technologies with near-term promise will pass to the STE team. At the end of the STE phase, Army leaders would select the technologies to invest in developing for the module. Those technologies not sufficiently mature would pass to the next module's STE team. In this way, the Army would continue high risk technology development, while mitigating risk in the near-term development of forces.

The acquisition and fielding process currently used by the Army requires radical transformation. Consider the fielding of the Paladin artillery system in the early 1990s. Beginning in 1987, the battlefield requirements and development process took eighteen months, followed by the decisions on structure, equipment, stationing, affordability and resourcing (an additional twelve months). This was followed by the Modified Tables of Organization and Equipment (MTOE) documentation process (over six months), and the personnel training and equipment distribution processes (thirty months). By the time the first unit stood up and began training, almost six years had elapsed since the decision to field Paladin battalions. The earlier discussion about the likely pace of technological evolution suggests that six years is far too long a period. Key to the force development process for the adaptive transformation strategy is the rapid development of equipment prototypes. This would allow continued development of training and employment concepts, as well as providing an ability to make changes to the equipment early in the Research, Development, and Acquisition process based on early testing.

There will be an increase in industry contractor support to the units, particularly during the Fielding Phase, but most likely into the early stages of the module's Operational Phase. This continues the trend seen now in the development of high technology equipment. It allows for continuity of maintenance, as well as hands-on training by the contractors with the soldiers of the unit. With the acquisition of more off-the-shelf equipment, this requirement will increase. Key would be integration of the contractors into the development and fielding teams from the start.

Soldiers

With the Army undergoing change, and the perpetual existence of at least five generations of forces (in addition to SOF forces, considered separately), major changes to the current personnel system is necessary. The degree of differentiated specialization between modules suggests that soldiers would need to be specialized as well. Indeed, it is likely that a particular Military Occupation Specialty (MOS) will exist in the units of a single module. This, in turn, suggests that soldiers should remain in units for longer periods than is currently the case. Personnel policies would have to undergo radical transformation, perhaps along lines closer to a true regimental system, thus allowing for much greater stabilization of units.

Soldiers would start their careers in a module and remain in that module throughout their career. In addition to offering family stability and significantly reduced unit turbulence, stabilization would allow a considerable reduction in training turbulence, because it would be easier to maintain standards. Moreover, units can expand the cycle of training through the echelons. The most appealing aspect of a regimental system is the enhanced cohesion in units, a quality that will be at a premium in the future decentralized and distributed operating environments.

One of the great impediments to implementation of a regimental system today is the requirement to man overseas billets. Without forecasting a reduction in the Army's overseas presence, this requirement could be met through unit rotations, most likely at the Brigade Combat Team level. To reduce the logistical challenges to such a rotation scheme, the five modules could be aligned with common overseas bases. In other words, a module would sponsor a particular overseas requirement and would be responsible for rotating units through the overseas deployments.

The many requirements for staffing Army- and Joint-wide organizations would be filled by unit standing requirements. Thus, a mid-grade NCO may leave his unit to become a recruiter for a few years. He would then return to the same unit. Similarly, a Captain might leave company command to become an instructor at one of the military colleges, then return to his unit as a Major. Promotions and school selections would be decentralized, at least to Major/CW-4/First Sergeant, as the requirements for the units of one module will be different from those of another.

ADVANTAGES OF THE ADAPTIVE TRANSFORMATION MODEL

The adaptive transformation model outlined above offers several advantages, each discussed below.

- It allows for flexibility, as it facilitates adaptation to the strategic environment on a dynamic basis.
- It is less likely that potential adversaries can predict the reaction of the U.S. to their actions.
- It forces development of an institutional system that can adapt rapidly in time of need.
- It allows for the Army to take advantage of technological breakthroughs and emerging concepts in a timely manner.

Flexible adaptation to the strategic environment. The only thing certain about the future global environment is that it will be increasingly dynamic and unpredictable. It is dangerous to think that there is reasonable assurance the Army is preparing correctly for the future. Further, it is not reasonable to believe that the United States will have the corner on the market of technological advances, or of the integration of those advances into military systems. The development of constrained defensive spending worldwide combined with increasing military technological potential precludes accurate forecasts of which technologies, in what quantity and form, will be incorporated in the military systems of future adversaries.⁷ So, it is likely that “we will get it wrong”, as Michael Howard suggests. In the absence of certainty, or even reasonable guesses, the logical approach is to keep options open—build a tool box with a lot of tools.

The absence of accurate prognosis of the future does not mean, however, that the Army should not develop its capabilities. Even though technological and doctrinal dominance may be fleeting, they are still exceptionally advantageous. Though the enemy may adapt, the superior force will certainly have an advantage in the first stages of a conflict. Further, apparent military dominance provides a definite advantage in diplomacy. Most importantly, remaining on the leading edge of technology and concepts provides a good jump start in adapting to the battlefield environment. This model allows the Army to adapt continually to the changing environment, while maintaining modern forces.

Difficult for adversaries to predict. The ability to develop and field new forces rapidly makes it less likely that adversaries will be able to predict a likely reaction by U.S. armed forces.

Further, future opponents will find it difficult to predict how U.S. forces will fight. In developing forces and concepts for employment, Army planners must avoid doing so in a vacuum. Potential adversaries will also adapt, to a large extent in reaction to adaptations by the U.S. armed forces. As Colin Gray has suggested,

New technologies, extending through revolutions in military affairs, lose their relative potency as others engage in parallel discovery, emulate, or invest in capabilities and methods to evade and thwart the leading edge of supposedly revolutionary developments.⁸

Sun Tzu said that if one can predict how the enemy will fight, he has won half the battle before it starts. Having a continually changing force structure and concepts for operations makes it extremely difficult for a potential adversary to anticipate how the Army will operate.

As the Army fields and employs forces, potential adversaries will watch and learn. They will adapt their ways and means to counter U.S. advantages. Since the future environment is likely to include continued distribution of technology, as well as a corresponding ability to acquire material and ideas, it is likely that adversaries could adapt rapidly. The key for military planners will be to anticipate the reactions of adversaries and incorporate counter-counter measures into the forces, either into the module approaching fielding, or into the next module. An adaptive transformation model allows relatively rapid counteractions to take place in force development.

Develops an institution that can adapt rapidly. There are three major components necessary to allow rapid adaptation. First, the organization must comprise individuals who can think rapidly and adaptively. Second, the materiel development processes must be streamlined so that the gap between the discovery of new technologies and the fielding of relevant systems is minimized. Third, the organization must rapidly develop concepts into doctrine and field that doctrine.

A consistent theme throughout this paper has been that though technological dominance may be temporary, the ability to adapt faster than the adversary is the key to success. Therefore, educated, trained, and innovative people offer the potential for timeless dominance, as the technologies and concepts for fighting come and go. As the writers of JV 2020 note, “thinking will be at a premium since anyone can get access to the technology.”⁹

One of the greatest difficulties facing the U.S. armed forces is the reality that it is more difficult for large organizations (particularly those with a deep sense of conservative tradition) to adapt rapidly than for smaller or newer organizations. This creates a danger that U.S. adversaries may transform themselves faster than the U.S. forces — in essence, they might be able to get inside the idea-to-fielding cycle. As one scholar suggested:

Although information technology is touted as a means to get inside an adversary's decision loop, the reality is that a street fighter or warrior nation unencumbered by Western-style procurement regulations might easily be able to get inside of our acquisition loop, and field newer weaponry well before we finish buying already-obsolete equipment.¹⁰

An adaptive transformation model that stresses continual transformation of forces will discipline the institution so that it will be unlikely that any potential adversary will be able to get inside the "adaptation cycle".

Allows for addition of technology as acquired without slowing progress. This model allows for meeting near- to mid-term requirements while continuing the march towards the long-term needs. Even with significantly streamlined acquisition systems, it is certain that a large organization can not keep up with the advances in technology. As discussed above, it is increasingly evident that while informational and other technologies relying on electronics are advancing rapidly, those technologies underwriting vehicles and weapons platforms, such as propulsion systems, composite materials, electronic and laser weapons, and munitions, are not advancing as fast. But they will become available at some point in the future. And it is certain that advances in technology will continue indefinitely. If U.S. armed forces are to continue to rely on a technological advantage, they must take positive measures to ensure that they can retain that advantage. As the global environment becomes more open and militarily-relevant technologies become increasingly distributed, this will become more of a challenge for the U.S. Michael O'Hanlon captured this point succinctly:

Technology is continually advancing—particularly in a world that is systemically organized to conduct scientific and engineering research on a large scale. The armed forces of a country, such as the United States, that depends heavily on technology must innovate constantly in order to stay ahead.¹¹

The proposed model allows fielding of systems using the most current technologies available, with the knowledge that emerging technologies can be incorporated into a future generation, perhaps within a few years. Thus, though every Army unit may not be the most modern, the Army will possess some units that are at the cutting edge, while the rest of the Army is within twenty years of that edge. In case of a national emergency that requires rapid fielding of more units with a given capability, or upgrading of existing units, the system will be able to meet this requirement through "appliques" or complete fielding. By the same reasoning, the new concepts for fighting and doctrine could also be disseminated to new or rapidly transformed units, though admittedly, it may be more difficult to rapidly diffuse the doctrine and training than the technology.

THE CASE AGAINST AN ADAPTIVE TRANSFORMATION STRATEGY

There are several potential arguments against the model for adaptive transformation proposed above.

- One-fifth of the Army would not be ready for operations.
- The Army would be too much of a hybrid organization, making it too complex to logistically and organizationally support.
- Training and doctrine development would be disjointed between the several generations of organizations.
- Deliberate planning for the use of Army forces would be challenging to the Theater Commanders in Chief and to the Transportation Command.

One-fifth of the Army would not be ready for operations. Each module would have to undergo a transformation process every twenty years, meaning that for a few years the elements of that module would not be ready for operations. Four years is allocated to field the entire module, but individual units will be non-operational for a much shorter period. Additionally, in an emergency, the fielding of the module being transformed could be accelerated to increase the available forces. Additionally, new elements could also be fielded, and older modules could be upgraded if necessary. The capacity to accelerate such a change is inherent in the system, though the budgetary requirements would be increased. The ability to selectively upgrade earlier generations could be maintained through a dynamic series of “on-the shelf-appliqués”, similar to those used during the Persian Gulf Conflict.

The Army would be too much of a hybrid organization, making it too complex to logistically and organizationally support. Yes, the Army would be composed of a lot of unlike organizations. However, this can be seen as a source of strength, in terms of flexibility and unpredictability. Further, even following the current transformation strategy, the Army through 2030 will be a hybrid force, composed of some Objective Force units, some Interim units, some remaining Legacy units, the Rangers and Special Forces, and possibly the 101st and/or 82nd Airborne Divisions. The institutional supporting systems must be transformed along with the fighting forces, and one fundamental precept is that the supporting systems will have to be more flexible than they currently are.

Training and doctrine development would be disjointed between the several generations of organizations. Currently, the Army deals with two types of forces...light and heavy. Centralized training and tactical doctrine development would be extremely challenging

given at least five radically different types of organizations in the field, and the overall organization continually evolving. The current concept of transformation recognizes the requirement for decentralizing some training and doctrine development. For example, the Initial Brigades Combat Teams at Fort Lewis are, in essence, developing their own doctrine. Though not the subject of this paper, innovative individual training strategies that would conduct some centralized individual training but distribute specialized training to units has a lot of merit. Using a "regimental system" for assignment of soldiers would significantly reduce the challenges of individual training. The institutional training base should train common specialties and be responsible for education of NCOs and officers, but individual training in general could be more decentralized.

Deliberate planning for the use of Army forces would be challenging to the Theater Commanders in Chief and to the Transportation Command. CINCs will continue to identify required capabilities from the Army and the Army will continue to provide those capabilities. Currently, the CINCs identify requirements for the near- and mid-term while the Services, to include the Army, look more at the mid- to long-term. This adaptive transformation model would allow the gap between the CINC's developed requirements and Service long range plans to be closed somewhat. It is true, however, that with unit capabilities changing dynamically, war plans and contingency plans will have to be revised periodically (at least every four years using a four year phasing cycle). As it is extremely unlikely that the dynamic global environment will not require updating of war plans and contingency plans regularly, perhaps this could be a way to inject some discipline into the updates.

THE ROAD TO THE FUTURE

The Army has recognized the need to change. The Army Chief of Staff's plan to radically transform the Army is the right path. As with all plans, preparations must be made to alter the plan when the first shot is fired, while retaining the commander's intent. There are several challenges to the current strategy, which suggests that the Army should develop several alternative, or branch, strategies so that the train of transformation does not come to a stop but can take a different track to the same destination. This paper has suggested one such branch, one that will allow the Army to rapidly transform through an evolutionary strategy, which will continue indefinitely. In this way, the Army will be able to meet the challenges of the future, without having to overcome the inertial forces it faces today. Technology is a critical aspect of the American way of war, but this technology is only effective in the hands of innovative, well-

trained and well-led soldiers in effective and relevant organizations. The Adaptive Transformation Strategy described here provides an option to continue the spiral of development to provide the United States a timeless advantage over any potential adversary. This will ensure that the United States Army remains poised to be persuasive in peace, decisive in war, and able to promote and defend our nation's vital interests in any environment.

"When the pace of change outside an organization is greater than the pace of change inside the organization, the end is near."

—President of AT&T, 1997

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ENDNOTES

¹ Thomas Hobbes, Leviathan (Chicago: Encyclopedia Britannica, Inc, 1952), 54.

² Williamson Murray, The Emerging Strategic Environment: Challenges of the Twenty-First Century (Westport, CN: Praeger Publishers, 1999), xxxi.

³ U.S. Joint Chiefs of Staff, Joint Vision 2020 (Washington, D.C.: U.S. Government Printing Office, 2000), 3.

⁴ MG Robert Scales, Future Warfare Anthology (Carlisle Barracks, PA: U.S. Army War College: 1998), 35.

⁵ Michael Howard, "Military Science in an Age of Peace," Chesney Memorial Gold Medal Lecture, 3 October 1973.

⁶ Department of the Army, TRADOC, "Foundations of Army Transformation and the Objective Force Concept", Final Draft, 17 Jan 2001, 33-34.

⁷ National Intelligence Council, Global Trends 2015: A Dialogue About the Future with Non-Governmental Experts (Washington, D.C.: NIC, December 2000), 60.

⁸ Colin Gray, Explorations in Strategy (Westport, CN: Greenwood Press, 1996), 244.

⁹ U.S. Joint Chiefs of Staff, Joint Vision 2020, 3.

¹⁰ Charles J. Dunlap Jr., "21st Century Land Warfare: Four Dangerous Myths," Parameters 27 (Autumn 1997), 31.

¹¹ Michael O'Hanlon, Technological Change and the Future of Warfare (Washington, D.C.: Brookings Institute Press, 2000), 1.

BIBLIOGRAPHY

- Adams, Thomas K. "The Real Military Revolution." Parameters 30 (Autumn 2000), 54-65.
- Alberts, David. "Mission Capability PAckages." National Defense University Strategic Forum Paper #14, January 1995. www.ndu.edu/inss/strforum.
- Boren, David, and Edward J. Perkins. Preparing America's Foreign Policy for the 21st Century. Norman, OK: University of Oklahoma Press, 1999.
- Bracken, Paul. "The Military After Next." The Washington Quarterly 16 (Fall, 1993), 157-174.
- Burk, James, ed. The Adaptive Military: Armed Forces in a Turbulent World. 2d ed. New Brunswick, NJ: Transaction, 1998.
- Carter, Ashton B. "Adapting U.S. Defence to Future Needs." Survival 41-4 (Winter 1999-2000), 101-23.
- Cheney, Richard B., and Thomas N. Harvey. "Strategic Underpinnings of a Future Force." Military Review (October 1986), reprinted in Military Review 77 (January-February 1997), 197-201.
- Cheney, Richard B. Interview by PBS Frontline for the documentary "The Future of War," October 2000. From www.pbs.org/wgbh/pages/frontline/shows/future/interviews.
- Cohen, William S. Report of the Quadrennial Defense Review. Washington, D.C.: U.S. Government Printing Office, May 1997.
- Combat Studies Institute. "History of Transformation." Military Review 80 (May/June 2000), 17-29.
- Crowder, William, and others. Technology and Power Projection for the Army After Next: Applying Technology to Achieve the Vision of the Army After Next. Arlington, VA: Association of the United States Army, November 1997.
- Department of the Army, Office of the Deputy Chief of Staff for Operations. "Army Transformation—Making a Great Army Better." Briefing to Army War College, 26 October 2000.
- Department of the Army, Office of the Deputy Chief of Staff for Operations . Action Memorandum, Subject: United States Army Transformation Campaign Plan, dated 30 October, 2000.
- Department of the Army, Training and Doctrine Command. "The Objective Force: The Foundation of Army Transformation and the Objective Force Concept." Final Draft, Fort Monroe, VA: TRADOC, 24 January 2001.
- Department of the Army, Training and Doctrine Command. The Interim Brigade Combat Team: Organization and Operational Concept. Fort Monroe, VA: TRADOC, 20 June 2000

- Dubik, James MG. Interview by PBS Frontline for the documentary "The Future of War", October 2000. From www.pbs.org/wgbh/pages/frontline/shows/future/interviews.
- Dunlap, Charles J. Jr. "21st Century Land Warfare: Four Dangerous Myths." Parameters 27 (Autumn 1997), 27-37.
- Eash, Joseph E. III. "Joint Vision 2010 Technology." Joint Forces Quarterly 23 (Autumn/Winter 1999-2000), 43-46.
- Echevarria, Antulio J. LTC. "Warfighting's Moral Domain." Military Review 80 (March/April 2000), 3-6.
- Friedman, George and Meredith. The Future of War. New York, NY: St Martin's Press, 1996.
- Gleeson, Dennis J. Future Conflict: A Survey of Recent Literature. 1999
- Gourley, Scott. "Future Combat Systems: A Revolutionary Approach to Combat Victory." Army 50 (July, 2000), 23-26.
- Gray, Colin. Explorations in Strategy. Westport, CN: Greenwood Press, 1996.
- Haffa, Robert P. Jr. "Planning U.S. Forces to Fight Two Wars: Right Number, Wrong Forces." Strategic Review 27 (Winter 1999), 15-21.
- Handel, Michael I. "Clausewitz in the Age of technology." Clausewitz and Modern Strategy. Ilford, England: Frank Cass Publishers, 1986.
- Hillen, John. Interview by PBS Frontline for the documentary "The Future of War," October 2000. From www.pbs.org/wgbh/pages/frontline/shows/future/interviews.
- Howard, Michael. "The Forgotten Dimensions of Strategy." Foreign Affairs 57 (Summer, 1979), 975-986.
- Howard, Michael. "Military Science in an Age of Peace." Chesney Memorial Gold Medal Lecture, 3 October, 1973.
- Institute for Land Warfare. "Research and Development: Enabling Transformation." Arlington, VA: Association of the United States Army, October 2000.
- Jablonsky, David. "Time's Arrow, Time's Cycle: Metaphors for a Period of Transition." Parameters 27 (Winter 1997-1998): 4-27.
- Jaffe, Greg. "Army Scrambles for Funds as it Pursues Modernization." Wall Street Journal, 18 April 2000. A20.
- Johnston, Paul. "Doctrine is Not Enough: The Effect of Doctrine on the Behavior of Armies." Parameters 30 (Autumn, 2000), 30-39.
- Kern, Paul J. LTG. "The Future Battlefield." Army 50 (July 2000), 19-22.

Kincade, William H. "New Military Capabilities: Propellants and Implications." In The Uncertain Course: New Weapons, Strategies, and Mind Sets, edited by Carl G. Jacobsen (New York: Oxford University Press, 1987), 69-77.

Korb, Lawrence. Interview by PBS Frontline for the documentary "The Future of War," October 2000. From www.pbs.org/wgbh/pages/frontline/shows/future/interviews.

Krepinovich, Andrew F. Interview by PBS Frontline for the documentary "The Future of War," October 2000. From www.pbs.org/wgbh/pages/frontline/shows/future/interviews.

Krepinovich, Andrew F. "Ready for the Wrong War." Wall Street Journal, 1 Sep 2000, p A10.

Krepinovich, Andrew F. Testimony before House National Security Committee, Subcommittee on Military Procurement and Research and Development. 8 October 1998.

Krepinovich, Andrew F. "The Military-Technical Revolution: A Preliminary Assessment." Office of the Secretary of Defense/Office of Net Assessment, July, 1992.

Libicki, Martin, et all. "The Revolution in Military Affairs." National Defense University Strategic Forum Report, 1999. From www.ndu.edu/inss/strforum/z1106.

Lieberman, Joseph I. SEN. Interview by PBS Frontline for the documentary "The Future of War." October 2000. From www.pbs.org/wgbh/pages/frontline/shows/future/interviews.

Lieberman, Joseph I. SEN. "Techno-Warfare: Innovation and Military R&D." Joint Forces Quarterly 28 (Summer 1999), 13-17.

McBride, William M. "Challenging a Strategic Paradigm: Aviation and the U.S. Navy Special Policy Board of 1924." Journal of Strategic Studies (September 1991).

McCabe, Thomas R. "A Strategy for Unanticipated Threats." Strategic Review 25 (Winter, 1997), 55-61

Metz, Steven, and James Kievit. Strategy and the Revolution in Military Affairs: From Theory to Policy. Carlisle Barracks, PA: Strategic Studies Institute, June 1995.

Metz, Steven. "The Next Twist of the RMA." Parameters 30 (Autumn, 2000), 40-53.

Murray, Williamson. The Emerging Strategic Environment: Challenges of the Twenty-First Century. Wesport, CN: Praeger Publishers, 1999.

Murray, Williamson. "The Emerging Strategic Environment: An Historian's Thoughts." Strategic Review 27 (Winter, 1999), 31-39.

Murray, Williamson and Alann R. Millett. Military Innovation in the Interwar Period. Cambridge: Cambridge University Press, 1996.

National Defense Panel. Transforming Defense: National Security in the 21st Century. Arlington, VA: December 1997.

- National Intelligence Council. Global Trends 2015: A Dialogue About the future with Non-Government Experts. Washington, D.C.: National Intelligence Council, 2000.
- Odom, William O. COL. After the Trenches: The Transformation of the U.S. Army. 1999.
- Odom, William O. COL. "Transforming the Military." Foreign Affairs (July/August 1997), 54-64.
- O'Hanlon, Michael. Technological Change and the Future of Warfare. Washington, D.C.: Brookings Institute Press, 2000.
- Office of the Secretary of Defense. "Report of the Defense Science Board Task Force on DOD Warfighting Transformation." Washington, D.C.: U.S. Government Printing Office, September 1999.
- Owens, William ADM. "The Emerging U.S. System of Systems." National Defense University Strategic Forum paper #63. February 1996. From www.ndu.edu/inss/strforum.
- Parameters. Landpower in the 21st Century: Preparing for Conflict. Carlisle Barracks, PA: U.S. Army War College, 1998.
- Roxborough, Ian and Dana Eyre. "Which Way to the Future?" Joint Forces Quarterly 28 (Summer 1999), 28- 34.
- Sapolovsky, Harvey M. "On the Theory of Military Innovation." Breakthroughs (Spring 2000), 35-39.
- Scales, Robert H. Jr. "Adaptive Enemies Dealing With the Strategic Threat after 2010." Joint Forces Quarterly 23 (Autumn/Winter 1999-2000), 7-14.
- Scales, Robert H. Jr. Future Warfare: Anthology. Carlisle Barracks, PA: U.S. Army War College, 1999.
- Sheehan, John J. GEN. "Building the Right Military for the 21st Century." Strategic Review 25 (Summer, 1997), 5-13.
- Shinseki, Eric K. GEN. Testimony before the Senate Committee on Armed Services, 27 September 2000.
- Stavridis, James. "The Second Revolution." Joint Forces Quarterly 15 (Spring 1997), 8-13.
- Swan, Guy C. COL. "It's Time for a True Regimental System." Armor 109 (March/April 2000), 21-22.
- Taylor, Charles W. Alternative World Scenarios for A New Order of Nations. Carlisle Barracks, PA: Strategic Studies Institute, 1993.
- Toffler, Alvin, and Heidi Toffler. "Preparing for Conflict in the Information Age." Futurist 32 (June/July 1998), 26-31.
- Toffler, Alvin, and Heidi Toffler. War and Anti-War: Survival at the Dawn of the 21st Century. Boston, MA: Little, Brown, and Company, 1993.

- U.S. Commission on National Security in the 21st Century. Phase I Report: New World Coming: American Security in the 21st Century, 15 September, 1999. From www.nssg.gov.
- U.S. Commission on National Security in the 21st Century. Phase II Report: Seeking a National Strategy, 15 April 2000. From www.nssg.gov.
- U.S. Commission on National Security in the 21st Century. Phase III Report: Road Map for National Security: Imperative for Change, 31 January 2001. From www.nssg.gov.
- U.S. Defense Intelligence Agency. Global Threat Assessment: Looking to the Year 2016. Washington, D.C.: U.S. Government Printing Office, November 1997.
- U.S. Joint Chiefs of Staff. Concept for Future Joint Operations: Expanding Joint Vision 2010. U.S. Washington, D.C.: Government Printing Office, May 1997.
- U.S. Joint Chiefs of Staff. Joint Vision 2020. Washington, D.C.: U.S. Government Printing Office, 2000.
- Van Creveld, Martin. The Transformation of War. New York: The Free Press, 1991.
- Van Riper, Paul K., and Robert H. Scales Jr. "Preparing for War in the 21st Century." Parameters 27 (Autumn 1997), 4-14.
- Wass de Czege, Huba and Antulio Echevarria. "Landpower and Future Strategy: Insights from the Army After Next." Joint Forces Quarterly 21 (Spring 1999), 62-69.
- Wass de Czege, Huba BG. "Soldiers--Not Technology--Are the Keys to Continued Superiority." Army 51 (March 2001), 7-12.